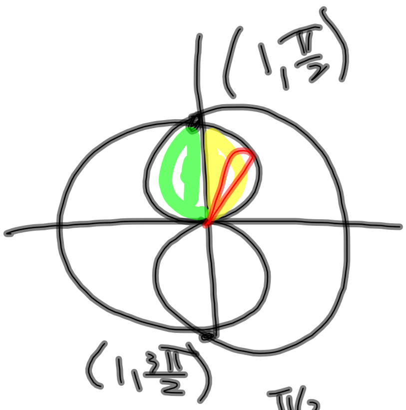
16 $\int \left\langle \frac{1}{t+1}, \frac{1}{(t+1)^2} \right\rangle dt$

$\left\langle \ln|t+1| + c_1, -\frac{1}{(t+1)^2} + c_2 \right\rangle$

$t=0 \quad \langle 4,3 \rangle$

Mar 7-8:44 AM

17.



$4 \cdot \int_0^{\pi/2} \frac{1}{2} (1-\cos\theta)^2 \, d\theta$

Mar 7-9:33 AM

Continuity

$f(x)$ is continuous at $x=a$ if:

1. $\lim_{x\to a} f(x)$ exists
   (lhl = rhl)
2. $f(a)$ exists
3. $\lim_{x\to a} f(x) = f(a)$

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$f(x)$ is continuous on $[a,b]$

means $f(x)$ is continuous at all the points on $[a,b]$

If $f(x)$ is differentiable at $x=c$
then $f(x)$ is continuous at $x=c$

Mar 7-9:41 AM

Is $f(x) = \frac{x-2}{x+2}$ continuous at:

a) $x = 2$ b) $x = -2$? Justify

a) yes

1. $\lim_{x \to 2} \frac{x-2}{x+2} = 0$

2. $f(2) = 0$

3 $\#1 = \#2$

b) No

1. $\lim_{x \to -2} \frac{x-2}{x+2} = \infty$

2. $f(-2)$ dne

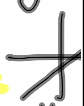
Mar 7-9:49 AM

Is $f(x) = \frac{x^2-4}{x+2}$ continuous everywhere

same? justify

$x = -2$

1. $\lim_{x \to -2} \frac{x^2-4}{x+2} = \lim_{x \to -2} \frac{\cancel{(x+2)}(x-2)}{\cancel{x+2}} = -4$

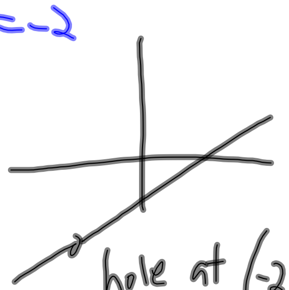


hole at $(-2, -4)$

2. $f(-2)$ dne

redefine $f(x)$ so that it is continuous at $x = -2$

$$f(x) = \begin{cases} \frac{x^2-4}{x+2}, & x \neq -2 \\ -4, & x = -2 \end{cases}$$



hole at $(-2, -4$

(removable discont

Mar 7-9:57 AM

3. let $f(x) = \begin{cases} 2x+1 & \text{for } x \le 2 \\ \frac{1}{2}x^2+k & \text{for } x > 2 \end{cases}$

For what value of k will f(x) be continuous at x=2? ~~Justify~~

$k=3$

1. $\lim_{x \to 2} 2x+1 = 5$ lhl

$\lim_{x \to 2} \frac{1}{2}x^2+k = 2+k$ rhl

$2+k = 5$

$k=3$

2. $f(2) = 2 \cdot 2+1 = 5$

Mar 7-10:12 AM